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Original Research Article

Using Oxidized Regenerated Cellulose to Maintain a Non-Thermal Hemostasis near Spermatic Cord Structures on İnguinal Hernia Repair

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Abstract: Open and laparoscopic tension-free techniques of hernia repair using synthetic meshes are a well-accepted practice with an excellent patient comfort and a low recurrence rate. It is well known that, direct contact of the mesh to the vessels in the inguinal canal and perimesh fibrosis may have a negative impact on testicular flow. In this study we investigate the effectivity of ORC on bleeding control instead of other invasive techniques to maintain a non-invasive intervention next to spermatic cord structures to protect cord structures from thermal damage. A total of fourty-five patients underwent open Lichtenstein tension-free inguinal hernia repair due to direct/indirect or mixed inguinal hernia included this study. Electrocauterisation has not used, bleeding control maintained using packing with oxidized regenerated cellulose product. Intraoperative and postoperative complications especially hematoma, wound healing and enfectious complications has recorded. No intraoperative complications occured, all minor bleedings controlled with ORC. On postoperative period 2 patients developed urinary retention. No hematoma or wound infection occured postoperatively. We can strongly suggest the usage of oxidized regenerated cellulose to maintain hemostasis to protect spermatic cord structures from thermal tissue damage related with unipolar electrocautery usage in the light of our results that has shown a very successful hemostasis achievement.

Keywords: laparoscopic tension-free techniques, Lichtenstein, ORC.

INTRODUCTION

Open and laparoscopic tension-free techniques of hernia repair using synthetic meshes are a well-accepted practice with an excellent patient comfort and a low recurrence rate. It is well known that, direct contact of the mesh to the vessels in the inguinal canal and perimesh fibrosis may have a negative impact on testicular flow. Whether different operative techniques or mesh materials used have an effect on the integrity of the testicle, the influence of the resulting fibrosis on testicular perfusion, and spermatic cord structures is still unclear (Dilek, O. N. 2014). In this study we investigare the efficacy of using oxidized regenerated cellulose for bleeding control near spermatic cord as a non-traumatic option.

PATIENTS AND METHODS

A total of fourty-five patients underwent open lichtenstein tension-free inguinal hernia repair due to direct/indirect or mixed inguinal hernia included this study. After physical examination, superficial USG imaging of both inguinal region revealing inguinal hernia, patients prepared for surgery. Patients with recurrent inguinal hernia/urgent repair, bleeding/wound healing disorder, femoral hernia and unstable serious systemic disorders excluded from this retrospective study. Under spinal anesthesia, the preocedure has performed. After dissection of skin and subcutaneous tissue, the superior and inferior flaps of the external oblique aponeurosis are freed from the underlying contents of the inguinal canal and overturned and separated to expose the cremaster with the cord structures, the ilioinguinal and iliohypogastric nerves, the uppermost aponeurotic portion of the internal oblique muscle and conjoined tendon, and the free lower border of the inguinal ligament. Wide separation of the two flaps provided the space for placement and fixation of mesh under vision while protecting the nerves. The spermatic cord, along with the cremaster, is then lifted up and separated from the pubic bone for about 2 cm beyond the pubic tubercle to create space for extending the mesh well beyond the pubic tubercle.

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When lifting the cord it includes the ilioinguinal nerve, the genitofemoral nerve, and the spermatic vessels along with it. All of these structures then be encircled in a tape for ease of handling. The anatomic plane between the cremaster and the aponeurotic tissue attached to the pubic bone is avascular, and cord structures encircled in the tape separated from the floor of the inguinal canal up to the internal ring without using electrocautery. After Identification and management of hernia sac; the peritoneal sac is identified and separated from the spermatic vessels and the vas deferens up to its neck.(Figure-1) For a voluminous scrotal hernia sac, no attempt made to dissect it completely and excise it; not to result in ischemic orchitis.After high ligation of the hernial sac a synthetic mesh (ProGrip ™, Medtronic, Dublin, Ireland) placed and fixated with 8 stitches to the corners (Figure-2). After exploration of the surgical field; for the bleeding from suture holes near the spermatic cord, electrocauterisation has not used, bleeding control maintained using packing with oxidized regenerated cellulose (ORC) product (Figure-3) (Oxicel®, Betatech Medical, Istanbul,Turkey). Intraoperative and postoperative complications especially hematoma, wound healing and enfectious complications has recorded.

RESULTS

Repair using tension-free polypropylene mesh technique between June 2017 and May 2019. Thirty-one of them underwent elective open repair for direct inguinal hernia, eleven underwent elective open repair for indirect inguinal hernia and 3 for mixed inginal hernia. The median age of patients was 47 years (range 34-69 years). Thirty-five patiennts were male and ten patients were female. No intraoperative complications occured, all minor bleedings controlled with ORC. On postoperative period 2 patients developed urinary retention. No hematoma or wound infection occured postoperatively. In 3 months follow-up no postoperative delayed complications or recurrence occured.

DİSCUSSION

Primary inguinal hernia repair is one of the most frequently performed surgical procedures averaging over 37000 elective procedures per year in the last four decades in England (Bouras, G. *et al.,* 2017; Laparoscopic surgery for inguinal hernia repair. 2004; Laparoscopic Surgery for Hernia. 2001). Therefore tittle is known about overall complication rates from inguinal hernia repair suggested in England. While the Hospital Episodes Statistics offer insights into reoperation, it fails to reliably record short-term complications such as wound infection or hematoma (Bouras, G. *et al.,* 2017; El-Dhuwaib, Y. *et al.,* 2013; Kazaure, H.S. *et al.,* 2012) National surveillance initiatives for surgical site infection do not routinely include patients undergoing inguinal hernia repair.In this study we investigate the effectivity of ORC on bleeding control instead of other invasive techniques to maintain a non-invasive intervention next to spermatic cord structures to protect cord structures from thermal damage. Anatomy of the spermatic cord has been well studied because of its important role in testicular physiology and surgery. The spermatic cord is composed of the vas deferens, testicular vessels including testicular artery and veins, autonomous nerves, spermatic muscle andfascia (Dilek, O. N. 2014; Abramson, J.H. *et al.,* 1978). Each of these structures could be various effects on testicular perfusion. A loss of the temperature differential may lead to testicular dysfunction (Mieusset, R. *et al.,* 1987). It is shown that thermographic measurements at the testicle showed a significantly increased temperature in all groups including open mand laparoscopic hernia repair techniques compared to preoperative measurements. They also noted that both the surgical technique and the mesh material have an impact on integrity of spermatic cord and testicular function (Junge, K. *et al.,* 2011). In the light of this knowledge our aim with this study to evaluate the efficacy of ORC usage for hemostasis not to use electrocautery as a thermal based hemostatic technique.

Additionally it has been proven that the unilateral damage to the deferent duct may affect fertility by production of ASA, which can be determined in serum before an evident histological unilateral or bilateral damage, as shown in a rat model (Krnić, D. *et al.,* 2016; CHEHVAL, M. J. *et al.,* 2002). Also, it can be affected by free radicals discharged after ischemia in gastrointestinal organs (Isik, A. *et al.,* 2015). This is an autoimmune reaction which is responsible for damaging the function of the contralateral testis. It was hypothesized that increased testicular tissue ischemia and hypoxia damage to the basement membrane of endothelial and Sertoli cells in the seminiferous tubules may lead to the destruction of the blood-testis barrier, activating autoimmune reaction to produce ASA and result in infertility by direct interaction with sperm or indirect change to the local microenvironment(Krnić, D. *et al.,* 2016).

As the thermal tissue injuries arising from electrocautery is a very well known entity, it has shown that there was a statistically significant relationship between the increase in maximum temperature values and the separation among tissue layers, edema, congestion, necrosis, hemorrhage, destruction in blood vessel walls and fibrin accumulation, and between the existence of fibrin thrombus and tissue damage depth (Beriat, G. K. *et al.,* 2012). By this knowledge we can strongly suggest the usage of ORC to maintain hemostasis to protect spermatic cord structures from thermal tissue damage related with unipolar electrocautery usage in the light of our results that has shown a very successful hemostasis achievement.

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